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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/659,728	09/10/2003	Yongjun Jeff Hu	MICRON.165DV1	3883
20995	7590	07/30/2004	EXAMINER	
KNOBBE MARTENS OLSON & BEAR LLP			NHU, DAVID	
2040 MAIN STREET			ART UNIT	
FOURTEENTH FLOOR			PAPER NUMBER	
IRVINE, CA 92614			2818	

DATE MAILED: 07/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/659,728

Applicant(s)

HU, YONGJUN JEFF

Examiner

David Nhu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

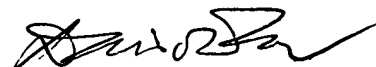
### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☒ Certified copies of the priority documents have been received in Application No. 09/887,449.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 01.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_



## DETAIL ACTIONS

### Drawings

1. There is no description of (134) in figure 4. Also, there is no description of **the layer** on the layer 124 in the figure 4.

### ***Claim Rejections - 35 USC § 112***

2. *The following is a quotation of the second paragraph of 35 U.S.C. 112:*

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-2 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, “ **the** work function “ lacks a clear antecedent basis.

Claim 2, “**the** adjacent layers “ lacks a clear antecedent basis.

### ***Claim Rejections - 35 USC 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Background of Invention (BOI) in view of Gardner et al (5,854,115).

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**Regarding claims 1**, (see BOI, figure 1, pages 1-4), teach a semiconductor device comprising: a semiconductor substrate (PMOS, NMOS); a dielectric layer (SiOH) positioned on the semiconductor substrate; an interconnecting layer (TiNx).

It is noted that BOI fails to teach a metal silicide wherein the metal is matched with the silicide so that the metal is inhibited from reacting with the dielectric layer and also wherein the metal is selected such that selective nitridation of the metal silicide lowers the work function of the metal silicide.

However, Gardner, (see figures 8-12, col. 6, lines 24-67, col. 7, lines 1-19), teach a metal silicide 68 wherein the metal is matched with the silicide so that the metal is inhibited from reacting with the dielectric layer 52 and also wherein the metal is selected such that selective nitridation of the metal silicide lowers the work function of the metal silicide.

Regarding claims 2-8, BOI, pages 1-4, and Gardner, col. 1-8, also teach the metal selected is the metal silicide; the conductive layer on the interconnecting layer such that the dielectric layer together define a gate stack; wherein the metal comprises tantalum; the substrate is silicon and the dielectric layer is silicon oxide; the conductive layer comprises tungsten, cobalt, nickel, silicide.

It would have been obvious to one having ordinary skill in the art at the time of the present invention to apply the teachings of Gardner into the method of BOI as both are related to the same subject matter of fabricating a semiconductor device having a gate stack, a gate oxide, isolation structures, a conductive layer, a metal silicide interconnecting layer for contacting the conductive layer, the metal is selected selective nitridation of the metal silicide.

### **Conclusion**

6. The prior art made of record and not relied upon is considered pertinent to

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applicant's disclosure: Tseng'557 is cited as of interest.

7. A shortened statutory period for response to this action is set to expired 3 (three) months and 0 (zero) day from the date of this letter. Failure to respond within the period for response will cause the application to become abandoned (see 710.02 (b)).

8. Any inquiry concerning this communication on earlier communications from the examiner should be directed to David Nhu, (571)272-1792. The examiner can normally be reached on Monday-Friday from 7:30 AM to 5:00 PM. The examiner's supervisor, David Nelms can be reached on (571)272-1787.

*The fax phone number for the organization where this application or proceeding is assigned is (703)872-9306.*

*Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956*

David Nhu



July 27, 2004